TENSIONED SUPPORT RING FOR WIND AND WATER TURBINES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of a provisional patent application No. 62/525,188, filed 2017 Jun. 27 by the present inventor.

BACKGROUND

Prior Art

[0002] The following is a tabulation of some prior art that presently appears relevant:

Number	Issue Date	Patentee
3,942,839	Mar. 9, 1976	Thomas O. Chalk
4,330,714	May 18, 1982	Otto J. M. Smith
6,064,123	May 16, 2000	Nils Erik Gislason
U.S. Pat. No. 8,629,570 B1	Jan. 14, 2014	Kamen George Kamenov
US 2008/0253892 A1	Oct. 16, 2008	James G. P. Dehlsen
DE202011108484U1		
DE102012009145A1		Klaus Hofmann

[0003] Wind power provides an important source of carbon free power. But to obtain the maximum benefits, it's best to be very large. Large things tend to be expensive and there will always be a need for cost containment.

[0004] Currently the worlds largest wind turbine is the Vestas V-164 with a rotor diameter of 164 meters at a cost of around 9 million dollars.

[0005] The high price tag comes from certain obvious difficulties like hanging extremely large blades on a nacelle at the top of an extremely large tower. Plus there's a lot of expensive parts. Parts that keep the rotor facing into the wind. There needs to be a motor in each blade to enable pitch control. It requires a brake on the hub shaft to keep things under control during extreme conditions.

[0006] Also, there is a less obvious expense related to size. All 3 bladed turbines have similar speeds at the tips of the blades. This means that a small turbine will spin extremely fast which is very convenient when it comes to generating electricity.

[0007] But the opposite is true for very large turbines. As the diameter goes up, the turn speed goes down. This means that all the energy is concentrated into a very slow moving hub, which requires an extremely strong gear box to cope with the incredibly high torque involved.

[0008] US 2008/0253892 A1 by inventor James G. P. Dehlsen Pub. Date: Oct. 16, 2008 shows a tensioned ring support structure to help with the difficulties of attaching giant blades. But it doesn't do anything to alleviate a huge concentration of power at the hub shaft. In fact, it must add additional spokes for the purpose of transferring power there.

[0009] DE202011108484U1 brings the power to a generator located at ground level with a rope drive. But in the case of a very large turbine, it would need to be a very strong rope due to the incredibly high torque. As the size goes up, at some point, the weight of the rope alone would become a limiting factor.

[0010] U.S. Pat. No. 3,942,839 issued to Thomas O. Chalk on Mar. 9, 1976 shows a simplified way of making a tensioned support wheel that involves a giant ring with blades on the Inside and spokes that are simultaneously tensioned by spreading apart two sets of hubs.

[0011] U.S. Pat. No. 4,330,714 issued to Otto J. M. Smith on May 18, 1982 & U.S. Pat. No. 6,064,123 issued May 16, 2000 are two other examples of rotor assemblies comprised of large rings or wheels with blades on the inside. In at least two of these cases, the rotor is supported by a second tower. A second tower support has obvious structural benefits in the sense that you no longer have heavy parts with no support on one side of the hub.

[0012] Another advantage of this design is that it allows the electricity generating parts to be located at the base where these parts are more easily installed and maintained.

[0013] A less obvious advantage is that the power is being tapped near the blade tips. This is where movement is fast and forces are light. But even with these advantages, the regular sort of three bladed turbine seems to be dominating the market. Maybe wind wheels are uncommon because they don't scale up well. Maybe these designs are only practical if kept under a certain size that is well below the current recorded holding rotor diameter of 164 meters.

SUMMARY OF THE INVENTION

[0014] This invention involves a method of creating a turbine rotor that is based on a new type of tensioned support ring. This support ring is extremely strong, lightweight and inexpensive. By serving as a blade holder it can increase the size of the blades while decreasing the costs. This can be achieved because the blades no longer have extreme strength requirements. As a result, the blades could be made of smaller and lighter pieces that are assembled on site.

[0015] And while most commercially available wind turbines tap power at the slow moving hub, the tensioned support ring allows power to be tapped much closer to the fast moving blade tips. As a result, a much lighter gearbox can be used to create a spin rate required for efficient electricity production.

[0016] With a normal large scale wind turbine, there needs to be a motor in each blade to control blade pitch. Also, there needs to be a brake on the rotor to keep things under control during extreme wind conditions. But with the tensioned support ring, a single motor and a few simple parts can accomplish the same results at a significantly reduced cost.

BRIEF DESCRIPTION OF DRAWINGS

[0017] FIG. **1**A is a sectional view of a tensioned support ring.

[0018] FIG. **1**B is a plan view of the same tensioned support ring shown in FIG. **1**A.

[0019] FIG. **2**A is a sectional view of a tensioned support ring with spokes that do not pass through the elbows as they do in FIG. **1**A and FIG. **1**B.

[0020] FIG. **2**B is a plan view of the same tensioned support ring shown in FIG. **2**A.

[0021] FIG. **3** is a perspective view of some of the tensioned ring parts including an elbow, a spoke wire, and two hub plates.

[0022] FIG. **4** is a perspective view of an alternative elbow for a tensioned support ring.